

WHAT IS CLAIMED IS:

1. A field-effect semiconductor device comprising:

a channel layer;

a contact layer;

a semiconductor structure having an electron affinity different from those of the channel layer and the contact layer and formed between the channel layer and the contact layer, the semiconductor structure having a first junction face between the semiconductor structure and the channel layer and having a second junction face between the semiconductor structure and the contact layer;

an ohmic electrode formed on the contact layer; and

a Schottky electrode formed on the semiconductor structure;

wherein the first junction face between the channel layer and the semiconductor structure and the second junction face between the contact layer and the semiconductor structure are iso-type heterojunctions.

2. A field-effect semiconductor device according to claim 1, wherein the channel

layer and the semiconductor structure at the first junction face are each formed of n-type doped layers, and the contact layer and the semiconductor structure at the second junction face are each formed of n-type doped layers.

3. A field-effect semiconductor device according to claim 3, wherein the channel layer and the semiconductor structure at the first junction face each have a dopant concentration of $1 \times 10^{18} \text{ cm}^{-3}$, and the contact layer and the semiconductor structure at the second junction face each have a dopant concentration of $1 \times 10^{18} \text{ cm}^{-3}$.

4. A field-effect semiconductor device according to claims 1 or 2, wherein the semiconductor structure is composed of a single material and has an electron-affinity smaller than those of the channel layer and the contact layer.

5 5. A field-effect semiconductor device according to claim 3, wherein the semiconductor structure is composed of a single material and has an electron-affinity smaller than those of the channel layer and the contact layer.

6. A field-effect semiconductor device according to claim 4, wherein the semiconductor structure is composed of AlGaAs.

10 7. A field-effect semiconductor device according to claim 5, wherein the semiconductor structure is composed of AlGaAs.

8. A field-effect semiconductor device according to claims 1, 2 or 3, wherein the channel layer is composed of InGaAs.

15 9. A field-effect semiconductor device according to claim 8, wherein the semiconductor structure is composed of a single material and has an electron-affinity smaller than those of the channel layer and the contact layer.

10. A field-effect semiconductor device according to claim 8, wherein the semiconductor structure is composed of AlGaAs.

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